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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,929	12/14/2004	Christoph Gunther Leussler	PHDE020153US	6889
38107	7590	04/05/2006	EXAMINER	
PHILIPS INTELLECTUAL PROPERTY & STANDARDS			VAUGHN, MEGANN E	
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CLEVELAND, OH 44143			2859	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/517,929	Applicant(s) LEUSSLER ET AL.	
	Examiner Megann E. Vaughn	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/14/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

The term "synergy coil" requires more explanation, does "synergy coil" refer to multiple coils put together, is it the same as a hybrid coil, or is it a type of coil with a trademark name "SYNERGY" coil like in US Patent 5,945,826?

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuderer et al (US 6518760) in view of Jevtic (US 2002/0169374).

Regarding claims 1 and 10, Fuderer et al discloses in figure 1, an MR device for MR imaging, which includes, a main field magnet (10) for generating a steady main magnetic field (column 6, lines 32-33);

a gradient coil system (11, 12) with a plurality of gradient coils for generating magnetic gradient fields;

an RF coil system (13, 16) for transmitting and/or receiving RF signals, which coil system includes at least two RF coil arrays (13, 16) which are integrated in one coil

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former and have been optimized for different applications (column 6 line 50- column 7 line 6);

a transmit/receive unit (15) for driving the RF coil arrays and for receiving MR signals from the RF coil arrays;

a control unit (29) for controlling the MR imaging, the control unit being arranged to switch over the RF coil arrays for temporally separate use of the individual RF coil arrays during the MR data acquisition (column 7, lines 43-48);

and a processing unit (25) for processing received MR signals.

Fuderer et al does not disclose each RF coil array comprising at least two RF coils decoupled from one another, and that the transmit/receive unit has a plurality of channels, notably a number of channels which corresponds to the number of RF coils of the RF coil array comprising the largest number of RF coils.

Jevtic discloses RF coils that can be decoupled even if they do not overlap (page 7, [0081]), each having their own channel (for example, figure 1, references 15, 25, and 35). Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to the decouple RF coils disclosed by Fuderer et al as well as insure that each coil has it's own transmission channel, as taught by Jevtic, in order to provide a superior performance in SENSE applications as well as to better isolate individual phased array channels, which leads to a better localization of each channel, as taught by Jevtic, which is desirable for any SENSE or SMASH application.

Regarding claim 2, Jevtic discloses in figure 1 at least two RF coil arrays are decoupled from one another (1, 2, 3).

Regarding claim 3, Fuderer et al discloses a first RF coil array that has been optimized for the SENSE or SMASH method (column 3, lines 39-55) and a second RF coil array has been optimized as a synergy coil array (column 6, lines 60-64).

Regarding claim 4, Fuderer et al discloses in figure 1 the RF coils of the SENSE RF coil array, surface coils, (16) are arranged in the coil former in such a manner that they are situated nearer to the object to be examined than the RF coils of the synergy coil array.

Regarding claim 5, Fuderer et al discloses in figure 1 that the SENSE RF coil array (16) comprises more and smaller RF coils than the synergy coil array (13).

Regarding claim 7, Fuderer et al and Jevtic disclose that all RF coils are connected to a separate channel of the transmit/receive unit as explained with respect to claim 1, and Fuderer et al discloses in figure 1 a control unit (20) that is arranged for the simultaneous acquisition of MR signals by means of RF coils of different RF coil arrays (column 7, lines 43-48).

Regarding claim 8, Fuderer et al discloses, in figure 1, provided means for feeding back MR signals acquired and evaluated in real time to the control unit (20) so as to change the control of the instantaneous MR data acquisition in conformity with the MR signals acquired and evaluated in real time (column 7, lines 38-53).

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4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuderer et al (US 6518760) in view of Jevtic (US 2002/0169374) as applied to claims 1-5, 7, and 10 above, and further in view of Leussler (US 5945826).

Regarding claim 6, Fuderer et al and Jevtic disclose the MR device with a synergy coil array and SENSE coil array as mentioned above in paragraph 3.

Fuderer et al and Jevtic do not disclose specifically that the RF coils of the synergy coil array overlap one another and that that RF coils of the SENSE RF coil array do not overlap one another.

Leussler discloses in figures 2 and 3, an MR device wherein the RF coils of the synergy coil array (70) are arranged so as to overlap one another (column 4, lines 40-44). Therefore it would have been obvious to a person having ordinary skill in the art at the time that the invention was made to overlap the RF coils of the synergy array disclosed by Fuderer et al and Jevtic in order to be decoupled from one another, as taught by Leussler (column 4, lines 43-44), and consequently preventing interactions which could cause errors during signal acquisition.

Leussler also discloses in figures 2 and 3 that the RF coils of the SENSE/SMASH RF coil array (10) are arranged so that they do not overlap one another. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made that the RF coils of the SENSE/SMASH coil array should not overlap each other, as taught by Leussler, because the sensitivity of the surface coils is dependent on the location of the coil with respect to the patient and

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not to each other (column 1, lines 24-28), making a non-overlapping arrangement more preferable for an overall improved signal-to-noise ratio.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuderer et al (US 6518760) in view of Jevtic (US 2002/0169374) as applied to claims 1-5, 7, and 10 above, and further in view of Harvey et al (US 2002/0060567).

Regarding claim 9, Fuderer et al and Jevtic disclose the control unit (20) arranged to acquire MR signals from a first sub-region of the k space by means of a first RF coil array, and to acquire MR signals from a second sub-region of the k space by means of a second RF coil array (Fuderer et al, column 8, lines 22-25).

Fuderer et al and Jevtic do not disclose that the acquired MR signals from the first sub-region of the k space by means of a first RF coil array is the acquisition of MR signals from the central region of the k space by means of a synergy coil array, and the acquired MR signals from a second sub-region of the k space by means of a second RF coil array, is the acquisition of MR signals from edge regions of the k space by means of a SENSE RF coil array or a SMASH RF coil array.

Harvey et al discloses a magnetic resonance method for forming a fast dynamic image from a plurality of signals acquired simultaneously from an array of multiple sensors, where the first acquisition region is the central region of k-space and the second acquisition region is the outer k-region (page 4, claims 6 and 7). Therefore it would have been obvious to a person having ordinary skill in the art at the time that the invention was made to use the two RF coil arrays disclosed by Fuderer et al and Jevtic,

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the synergy coil array to acquire the central acquisition region of k-space and the SENSE/SMASH RF coil array to acquire the outer/rest of the acquisition region of k-space, as taught by Harvey et al, in order to obtain more images overall faster, which could be beneficial for imaging contrast changes (Harvey et al, page 3).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Greenman et al ("Bilateral Imaging Using Separate Interleaved 3D Volumes and Dynamically Switched Multiple Receive Coil Arrays) discloses multiple coil arrays for simultaneous MR Imaging, Van Den Brink et al (US 6556010) discloses in figure 1 a magnetic resonance imaging method using multiple RF coil arrays, some surface coils, and the SENSE technique for image reconstruction, Fujita et al (US 6975115) discloses at least three parallel acquisition RF coil arrays, and Kocharian et al ("Simultaneous Image Acquisition Utilizing Hybrid Body and Phase Array Receiver Coils") discloses the combination of volume coils and surface coils for simultaneous image acquisition.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Megann E. Vaughn whose telephone number is 571-272-8927. The examiner can normally be reached on 8 am- 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEV
Patent Examiner Art Unit 2859
3/29/06



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